



**UNITED STATES DEPARTMENT OF COMMERCE**  
**Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/085,298	05/27/98	GOLDBERG	R TI-25588

MM12/1117

ROBBY T HOLLAND  
TEXAS INSTRUMENTS INCORPORATED  
PO BOX 655474 MS 219  
DALLAS TX 75265

EXAMINER

EATON, K

ART UNIT

PAPER NUMBER

2823

DATE MAILED:

11/17/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

**Office Action Summary**

Application N .

09/085,298

Applicant(s)

GOLDBERG, RICHARD TODD

Examiner

Kurt M Eaton

Art Unit

2823

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 May 1998.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some \* c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) \_\_\_\_\_.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

**Attachment(s)**

- 14) ☒ Notice of References Cited (PTO-892)
- 15) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 16) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 17) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 18) ☐ Notice of Informal Patent Application (PTO-152)
- 19) ☐ Other: \_\_\_\_\_

Art Unit: 2823

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 1 and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Suehiro et al..

In re claim 1, Suehiro et al. (herein referred to as Suehiro) teaches a method of forming a dielectric layer on a silicon-containing bottom structure {column 10, lines 9-14}, the method including the steps of: providing nitrogen gas {column 10, lines 23-26}; heating the silicon-containing structure to an elevated temperature which is greater than 700 °C {column 10, lines 23-24}; and striking a plasma above the silicon-containing structure, wherein the combination of the nitrogen-containing gas, the elevated temperature, and the plasma resulting in the thermal formation of a dielectric layer on a portion of the silicon-containing structure {column 10, lines 9-14, 23-26}; and providing a top structure over the dielectric {column 10, lines 27-28}. It would have been obvious to one of ordinary skill in the art at the time the invention was made that upon generating the plasma (which contains nitrogen), nitrogen-containing gas would have had to have been supplied.

Art Unit: 2823

In re claim 6, Suehiro teaches wherein the nitrogen-containing gas is pure N<sub>2</sub> {column 10, lines 23-24}.

*Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 3, 7, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suehiro as applied to claim 1 above, and further in view of Sun.

Suehiro substantially discloses the invention as claimed but fails to show wherein the elevated temperature is greater than 1000 °C.

Sun teaches, in an analogous art related to a method of performing LOCOS, a dielectric layer may be formed on a silicon-containing structure by exposing the structure to a nitrogen-containing plasma at temperatures between 950 and 1200 °C {column 1, lines 50-58}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the dielectric layer of Suehiro at substrate temperatures between 950 and 1200 °C as in Sun because, as evidenced by Sun, it is known in the art to form dielectric layers on silicon-containing structures at temperatures between 950 and 1200 °C. Additionally, the specification contains no disclosure of either the critical nature of the claimed dimensions or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen

Art Unit: 2823

temperature ranges or upon another limitation recited in a claim, the applicant must show that the chosen limitations are critical.

5. Claims 4 and 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suehiro and Suehiro in view of Sun as applied to claims 1 and 7, respectively, above, and further in view of Taft.

The inventions of Suehiro and Suehiro in view of Sun substantially discloses the invention as claimed but fail to show wherein the bottom structure is a silicon substrate and the top structure is a gate electrode.

Taft teaches, in an analogous art related to a method for forming a conductive interconnect structure, that a silicon nitride dielectric layer may be formed over a silicon containing structure such as a silicon substrate and that a gate structure may be formed over the silicon nitride dielectric layer {column 2, line 26 – column 4, line 47}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the bottom structure, dielectric layer, and top structure assembly in the inventions of Suehiro and Suehiro in view of Sun such that the bottom structure included a silicon substrate and the top structure included a gate structure as in Taft since, as evidenced by Taft, bottom structures made of silicon substrates and top structures made of gate structures, separated by a silicon nitride dielectric layer is well known in the art. Additionally, the specification contains no disclosure of either the critical nature of the claimed structures or any unexpected results arising therefrom.

Where patentability is said to be based upon particular chosen structure or upon another limitation recited in a claim, the applicant must show that the chosen limitations are critical.

Art Unit: 2823

6. Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suehiro and Suehiro in view of Sun as applied to claims 1 and 7, respectively, above, and further in view of Tseng.

The inventions of Suehiro and Suehiro in view of Sun substantially disclose the invention as claimed but fail to show wherein the bottom structure is a bottom electrode of a storage capacitor of a memory device.

Tseng teaches, in an analogous art related to a method for fabricating DRAM cells, that a silicon nitride dielectric layer may be formed over a bottom electrode of a storage capacitor of a memory device {column 8, lines 5-19}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the bottom structure in the inventions of Suehiro and Suehiro in view of Sun such that the bottom structure was a bottom electrode of a storage capacitor memory device as in Tseng since, as evidenced by Tseng, bottom structures formed as bottom electrodes for storage capacitors, with dielectric layers formed of silicon nitride overlying them is well known in the art. Additionally, the specification contains no disclosure of either the critical nature of the claimed structures or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen structure or upon another limitation recited in a claim, the applicant must show that the chosen limitations are critical.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suehiro in view of Sun as applied to claim 7 above, and further in view of Iyer.

Art Unit: 2823

Suehiro in view of Sun substantially discloses the invention as claimed but fails to show wherein the nitrogen-containing gas is comprised of a combination of  $N_2$  and  $O_2$ .

Iyer teaches, in an analogous art related to fabrication of semiconductor integrated devices, in Figure 1B, that a dielectric layer (203) may be formed over a silicon containing structure by reacting a  $N_2$  and  $O_2$  gases in a plasma discharge {column 4, lines 48-61}.

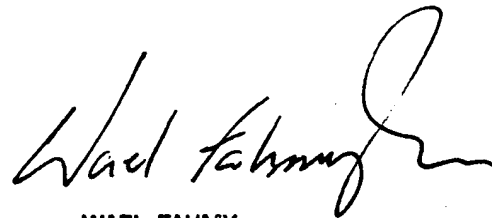
It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the dielectric layer of Suehiro in view of Sun using the nitrogen containing gas of Iyer since the two gases would have produced a dielectric layer over a silicon containing structure. Thus, the decision to form a dielectric layer using a pure nitrogen gas or a gas of nitrogen and oxygen, in the case as outlined above, would have required only routine skill in the art. Additionally, the specification contains no disclosure of either the critical nature of the claimed nitrogen-oxygen gas combination or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen gas mixture or upon another limitation recited in a claim, the applicant must show that the chosen limitations are critical.

### ***Conclusion***

8. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is (703) 308-7722 or -7724. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Art Unit: 2823

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at (703) 305-0383 and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [kurt.eaton@uspto.gov](mailto:kurt.eaton@uspto.gov).

A handwritten signature in black ink, appearing to read 'Wael Fahmy', with a stylized flourish at the end.

Wael Fahmy  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800